

Again and again I am seeing severe lymphemias with symptoms of leukemia, which after a time proceed to get well so that we necessarily hesitate now and then to give a hopeless prognosis as one ought to if he were absolutely certain that he was dealing with leukemia.

In the army Vincent's angina was considered a very harmless infection. It was found most often in trench mouths. But in our experiences when it is associated with leukemia it is a most potent factor in producing an early death.

To summarize then the complete story of the etiology, leukemia still has an unfinished chapter. The evidence in favor of an infectious theory is rather preponderating, but still far from conclusive. The best we can say as to its causation is to requote Dorothy Reed, when she concluded that it is due to some chemotaxis, with a special predilection for the bone-marrow.

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THE CONTENTS OF THE STOMACH: ITS STUDY AND INTERPRETATION.

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By glancing through the literature one sees the wide acceptance of the small tube as a means of removing the stomach contents by the fractional method, thus enabling one to study the activity of the stomach continuously over a period of hours. Although used by Europeans as early as 1912,¹ it was first brought to the attention of

the American profession by Rehfuß² in 1914, who later enlarged upon the benefits to be gained by the "fractional" study of the stomach contents. Our knowledge of the stomach activity as well as our ability to diagnose pathologic conditions has increased thereby manifold. Much constructive work has been done by Crohn³ and others. Yet the impression one gets from the literature is that each worker has many little points in technique and methods of procedure that differ from the others and which are never clearly explained in print. For that reason it seems wise to state our method of studying the stomach contents in the clinic in an attempt to keep this phase of stomach examination more uniform and possibly promote wider discussion and use.

The procedure is as follows: The evening before the test the patient is instructed to eat two or three prunes or raisins before retiring. He appears at the clinic at 8 A.M., having taken nothing since the night before. A Rehfuß² tube is passed and the contents of the fasting stomach completely removed, measured and examined. The technique of introducing this tube was described in a former paper,⁴ from which I quote: "This is done by having the patient open his mouth and say 'Ah.' " The metal tip is dropped behind the tongue and the patient swallows. To prevent gagging and retching the patient takes deep breaths. When this is done the tube can be passed to the 50 cm. mark with hardly an unpleasant sensation to the patient. When down the tube is kept to one side of the throat and causes very little annoyance. During this period the patient can talk, read or devote his attention toward any minor employment to pass the time. Saliva is frequently abundant. The patient is instructed to spit this out, not to swallow it." The tube is removed and the patient is given an Ewald test breakfast. (An oatmeal gruel is used by Crohn, given with the tube still in place. Others, I have learned, feed the gruel through the tube. However, if one wishes to reach as nearly the normal secretion as possible, it seems logical to avoid having a tube interfering with mastication or depriving the patient of the stimuli of taste and chewing. It seems a small but very essential point to bear in mind the physiology of the digestive secretions as is demonstrated by the works of Pawlow⁵ and Boldyreff.⁶ Also I have determined the HCl deficiency of the oatmeal gruel and find it quite the same as that of bread and water. I therefore feel the advantage lies with the simple bread and water meal which demands definite mastication.)

One-half hour following the beginning of the meal the tube is again introduced and 3 to 5 c.c. of contents removed. This is repeated every fifteen minutes until the two-hour period. At that time all the contents is removed, measured and tested. Each time the sample is withdrawn I insist on a little air being blown back, both before and after, to assure the purity of each specimen.

Such a procedure gives us abundant information. Motility, re-

tention, hypersecretion, presence or absence of normal and abnormal acids and ferments, bleeding, presence of pus or exfoliating gastric mucosa, abnormal albumin and malignant cells can be determined.

In the contents of the fasting stomach the presence of prunc or raisin skins speaks for retention. Normal stomachs twelve hours after a meal contain less than 100 c.c. of contents. Over this amount is found in retention and hypersecretion cases. The concentration of acid varies greatly from no free HCl and low total to very high acid which may be almost pure HCl. The presence of bile in these specimens is quite normal. One of the most important items in the study of the fasting contents is that of the microscopic elements. Here we look for pus and blood cells, the character of the gastric epithelial cells and the presence of cells with mitotic figures representing malignancy, which incidently are very rarely seen. The cells are studied in the fresh and stained preparations. Yeasts and flagellates may be found or Boas-Oppler bacilli may be seen when present. For the more complete study of the microscopic elements, as described by Leoper and Binet,⁷ while the tube is in the stomach one can introduce 30 c.c. of normal salt solution and immediately withdraw it, centrifuge the fluid and study the sediment in the fresh and stained condition. When malignancy may be suspected, modifications of the Wolff-Junghaus and allied tests can be carried out for the presence of abnormal albumin and proteolytic ferments.

The removal of only a few cubic centimeters of stomach contents, during the two-hour observation, is to prevent one from removing too large a quantity each time and thus interfere with the stimulation of the meal on the stomach secretion. Also by using 1 c.c. of content and titrating with $\frac{1}{10}$ normal sodium hydrate the buret reading gives the same figure as the use of 10 c.c. of content and one-tenth normal sodium hydrate.

For studying the presence of the ferments in the patients who show no free HCl during the two-hour period the one-hour specimen is selected, filtered and incubated with coagulated egg-albumen as is ordinarily carried out.⁸

After having determined, by titration, the amount of tenth normal hydrochloric acid and total acid in 100 c.c. of the fasting contents and in the fifteen-minute samples over the two-hour digesting period to properly study the findings obtained it is necessary to plot curves, using the acid values as ordinate and the time as abscissa, which portray the actual progress of the acid concentration. In other words, we graphically visualize the ever-changing chemical condition as it exists in the stomach during that period of digestion examined. The advantage of these curves in its superiority over the older "one sample test" that a few clinics still persist in using, is comparable to the advantage of the moving picture over a single snapshot.

These curves may or may not be of great value, depending upon how they are interpreted. Many clinicians, having expected to obtain direct conclusions from the actual acid values, have become discouraged with the fractional method and labeled it as quite

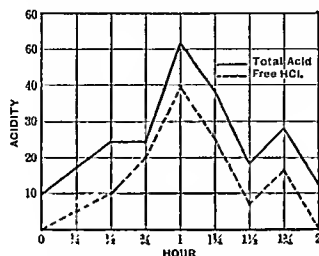


FIG. 1.—Type I, "normal," fasting content 25 c.c.; apex in one hour; one and a half-hour drop, with recovery in one and three-quarter hours seen in duodenal regurgitation.

unessential. The actual acid values mean very little. The shape of the curve means more. There are a few valuable points to look for in studying these curves: (1) Note the acidity of the fasting contents; (2) the apex of the curve; (3) the position of the curve in two hours; (4) the position of the HCl curve compared to the total

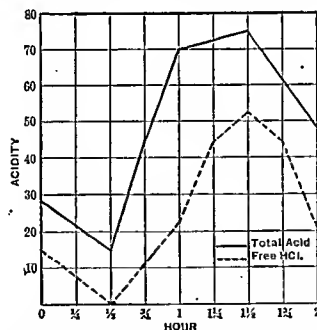


FIG. 2.—Type I, fasting content 50 c.c.; a slight variation between free and total acid curves but the shape is very similar; apex in one and a half hours.

acid curve, that is, whether it follows the total curve regularly or takes an independent and very irregular course.

There are five more or less general and distinct types of curves in which any fractional result will fall. By keeping these five types

in mind and placing the curves received in their proper group a definite knowledge of the secretory and motor activity of the stomach is obtained which becomes a positive item to aid in diagnosing the condition at hand. Type 1 (Figs. 1 and 2) begins with a moderate fasting acidity and rises to the apex in from one to one and a half hours and a steady decline. The apex may be 60 for total acid or 90. The free HCl curve follows total regularly and about twenty points below. This is considered the normal type.

There may be breaks in the smooth continuity of the curve with large sudden drops in acidity, free and total acid acting parallel. Bile may be present with these drops. Such defects in the regular outline are due to a reflux of duodenal contents into the stomach

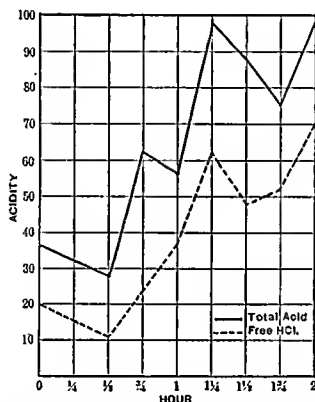


FIG. 3.—Type II, "ascending;" fasting content 50 c.c.; curves slight and irregular: but respond similarly; high point in two hours; mucus +; gastric cells +; diagnosis: duodenal ulcer, with recent hemorrhage.

and are quite a normal event, as demonstrated by Boldyreff.⁹ If blood is discovered with such duodenal regurgitation it is the one definite evidence of pathology in the duodenum (Rehfuess¹⁰).

The second type of curve (Figs. 3 and 4) frequently has a high fasting acidity, a quick drop occurring early after the test-meal and a steady rise to the two-hour period. This is an ascending type of curve frequently showing the HCl steadily approaching the total acid curve until at the two-hour period the stomach content may be almost pure HCl and of a value near 100. This type is found in cases of gastric ulcer of not too long standing, frequently in duodenal ulcers, in recent gall-bladder infections and sometimes in subacute or chronic appendicitis. One cannot say, upon looking at a curve

of this type: "Here is a case of duodenal ulcer," but it does represent the existence of a definite abnormal condition, namely, a marked

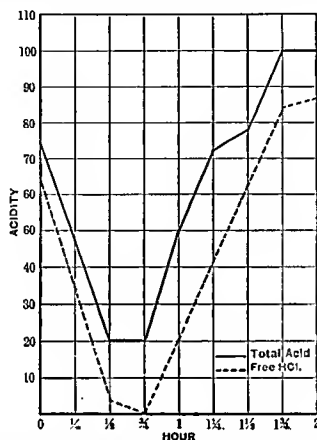


FIG. 4.—Type II, fasting content 50 c.c.; few gastric cells and leukocytes; high fasting, acid; sudden drop with meal and steady, rapid rise to apex in two hours; diagnosis: cholecystitis.

hyperactivity of the gastric secretory apparatus (McWhorter¹¹). This hyperactivity usually extends on to the next meal. Sometimes the apex is reached in or before one hour and from that point on the curve becomes almost a horizontal line, with occasionally the appearance of a sudden drop and quick recovery to the former level.

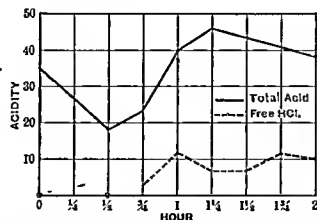


FIG. 5.—Type III, "irregular," fasting content 40 c.c.; mucoid; leukocytes +; free HCl, early absence, later low; irregular compared with total curve; total fairly normal shape; diagnosis: subacute gastritis.

The third type (Fig. 5) shows a total acid curve of possibly normal or low value, taking a fairly normal course, but with the HCl curve

very irregular and not in the least symmetrical with the total curve. The difference between the HCl and total acid values is usually over 20. Such a curve is found in cases of subacute gastritis of not too long duration or in conditions that tend to depress gastric secretion, such as chronic infective processes located at distant points, as for instance the mouth, gall-bladder and appendix. We are dealing here with a depressing influence on the secretory mechanism, possibly in some cases a direct damage to the gastric cells. We are helped, in the microscopic examination of the fasting contents, by the presence of pus, the mouth being above suspicion, or eosin-staining gastric cells, which reveal an inflamed condition of the gastric mucosa. We find cases of marked gingivitis when purulent material is expressed from between the red, swollen gums and the teeth and a curve of type three, the fasting contents showing many pus cells and squamous epithelial cells. It is reasonable to suppose there may be some local inflammatory condition of the gastric mucosa, but, without the presence of increased numbers of gastric cells, the conclusion is that the mouth infection is primary. In such cases a visit to the dentist for scaling and polishing the teeth will result in a large percentage of cures.

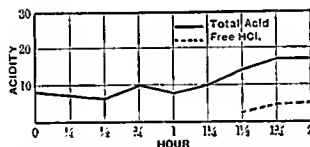


FIG. 6.—Type IV, fasting content 50 c.c.; leukocytes ++; epithelial cells +; no free HCl until late; total curve low; diagnosis: chronic gastritis and esophagitis.

The fourth type (Fig. 6) is really a progression of the third type. Here the total acid is moderately low, with a very low irregular HCl, reaching zero in one or more intervals during the two-hour period or only appearing in one or two samples. Such a curve is found in a chronic gastric inflammation of long standing, in focal infection with systemic reaction, including tuberculosis and lues and in cases of malignancy. With the last-named condition one is helped at times by finding, in the microscopic elements, cells containing mitotic figures.

The fifth type (Fig. 7) is a curve showing the total acid as having a value of about 10, holding mostly to a straight line. No HCl is discovered at any time. All of the samples look like a mixture of bread and water, with possibly the addition of considerable mucus. The ferments are entirely absent. With this curve we have the typical findings in achylia, which is not a disease but purely a manifestation of a deeper seated process. Achylia has been con-

sidered more in detail in a recent paper.¹² It is rather rare to find this curve in gastric malignancy but is seen no less rarely in malignancy elsewhere.

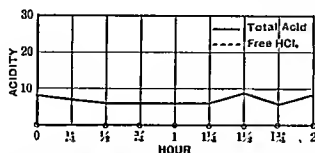


FIG. 7.—Type V, fasting content, 20 c.c.; mucus +; square epithelial cells ++; leukocytes ++; ferments absent; no free HCl; total curve a straight line under 10. This was a case of badly infected mouth and pulmonary tuberculosis.

There is one other form of curve (Fig. 8) occasionally seen in which the total acid is very low and no free HCl is found during the first hour, while the second hour result is definitely normal or similar to type 2. In this instance we are dealing with a psychic secretion (Rehfuss) during the first hour, showing inhibitory effect of nervousness, caused by the first introduction of the stomach tube, whereas in the second hour the chemical or normal secretion appears, uninfluenced by external factors. Such a curve should be repeated, at

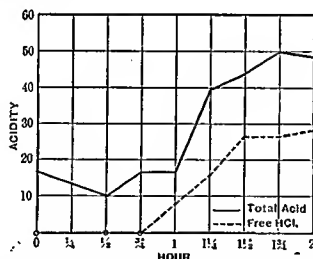


FIG. 8.—“Psychic curve,” no free HCl and low total first half of period, then rapid recovery to fairly high values. Patient thin and nervous. Result of second test similar to Fig. 1.

which time one receives a normal curve complete for the two-hour period.

Should a curve look unusual on the first day it is very advisable to repeat the examination once or twice. A steady type of curve will then be obtained which gives the secretory picture for that patient.

In many instances it has been a great help in realizing just how the free HCl curve varies in its progress from the total acid curve, to plot, in a different color, a curve for the difference between the

free and total acids. Normally, such a curve should be a straight line. Marked irregularity and unusual distance from 20 spells disturbance in HCl secretion. I have not been able to determine anything more specific in its interpretation.

Regarding the amount of secretion recoverable from the stomach two hours after the meal was begun, insufficient number of normal cases have been examined to draw conclusions. It would appear that over 100 c.c. of content definitely indicates a delay in emptying or an excess of secretion. This two-hour content usually contains but a small amount of starch, indicating most of the meal has passed the pylorus. The evidence of delay found in this last specimen, including the presence of over 100 c.c. of fluid, has been found to parallel the six-hour retention seen in the roentgen-ray examination.

Summary. A method is outlined for the fractional stomach examination which makes it possible to complete all the tried tests of gastric study in two hours and gives connected pictures of the secretion during this period. The procedure is simple and can be carried out by any practitioner with the aid of his nurse. The gastric curves are placed in five groups, no stress being laid on the actual acid figures, but emphasis is placed upon the position of the apex and the two-hour level of the curve, the difference between the free and total acid curves and the behavior of the free HCl curve. By repeating an examination a more stable, reliable curve is obtained. By carefully following out the above procedure it is possible to become more intimately acquainted with the detail of gastric activity, thus making it possible to carry out treatment by diet and medication in a more intelligent manner as well as making diagnoses of gastric complaints more accurate.

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